US010800023B1

(12) **United States Patent**
**Ferris**

(10) **Patent No.: US 10,800,023 B1**
(45) **Date of Patent: Oct. 13, 2020**

# (54) COLLAPSIBLE BREACHING TOOL

(71) Applicant: **Breaching Technologies, Inc.**, San Antonio, TX (US)

(72) Inventor: **Mark Ferris**, San Antonio, TX (US)

(73) Assignee: **Breaching Technologies, Inc.**, San Antonio, TX (US)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/035,289**

(22) Filed: **Jul. 13, 2018**

**Related U.S. Application Data**

(63) Continuation of application No. 15/016,597, filed on Feb. 5, 2016, now Pat. No. 10,058,991.

(60) Provisional application No. 62/140,421, filed on Mar. 30, 2015.

(51) **Int. Cl.**

| | |
|---|---|
| ***B25G 1/04*** | (2006.01) |
| ***B25D 1/00*** | (2006.01) |
| ***A62B 3/00*** | (2006.01) |

(52) **U.S. Cl.**
CPC ..... ***B25G 1/04*** (2013.01); ***A62B 3/005*** (2013.01); ***B25D 1/00*** (2013.01)

(58) **Field of Classification Search**
CPC .. B25G 1/04; B25G 3/30; B25G 1/043; A62B 3/005; B25D 1/00
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 5,996,442 | A * | 12/1999 | Carmien | B25D 1/02 294/53.5 |
| 6,182,539 | B1 * | 2/2001 | Webster | B25B 23/0021 81/177.2 |
| 8,220,852 | B2 * | 7/2012 | Fenstemaker | B25F 1/02 294/51 |

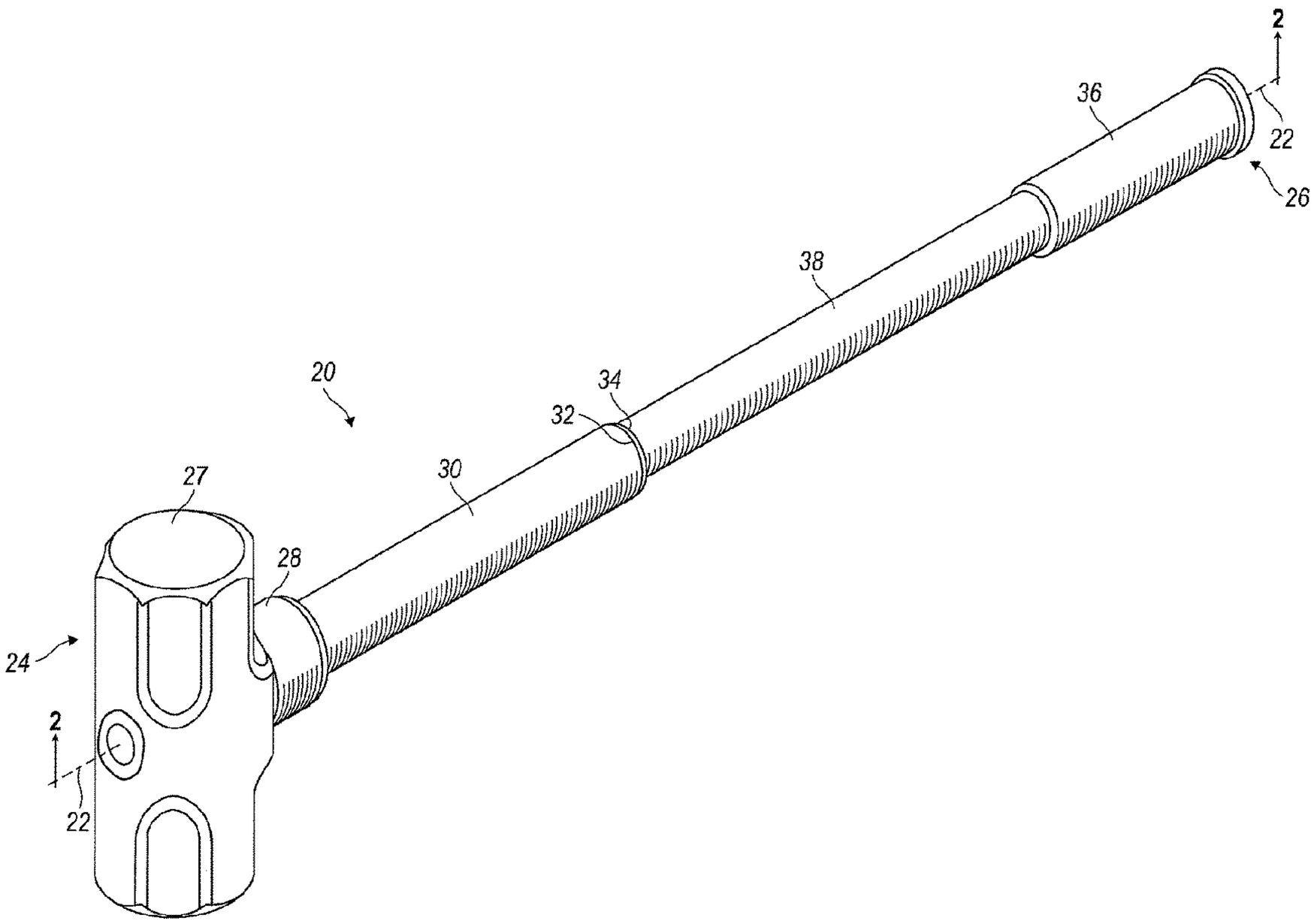
* cited by examiner

*Primary Examiner* — Monica S Carter
*Assistant Examiner* — Abbie E Quann
(74) *Attorney, Agent, or Firm* — Edward B. Marvin; Gunn, Lee & Cave, P.C.

(57) **ABSTRACT**

A collapsible breaching tool comprising a tool head; a handle hold connected to the tool head and having outer thread; a first handle tube having a first end, a second end, and defining a first handle tube volume; a second handle tube having a length, the second handle tube moveable between a first position in which most of the length is outside the first handle tube volume and a second position in which most of the length is within the first handle tube volume; an insert connected to the second handle tube, the insert having an inner thread engageable with the outer thread of the handle hold.

**20 Claims, 6 Drawing Sheets**



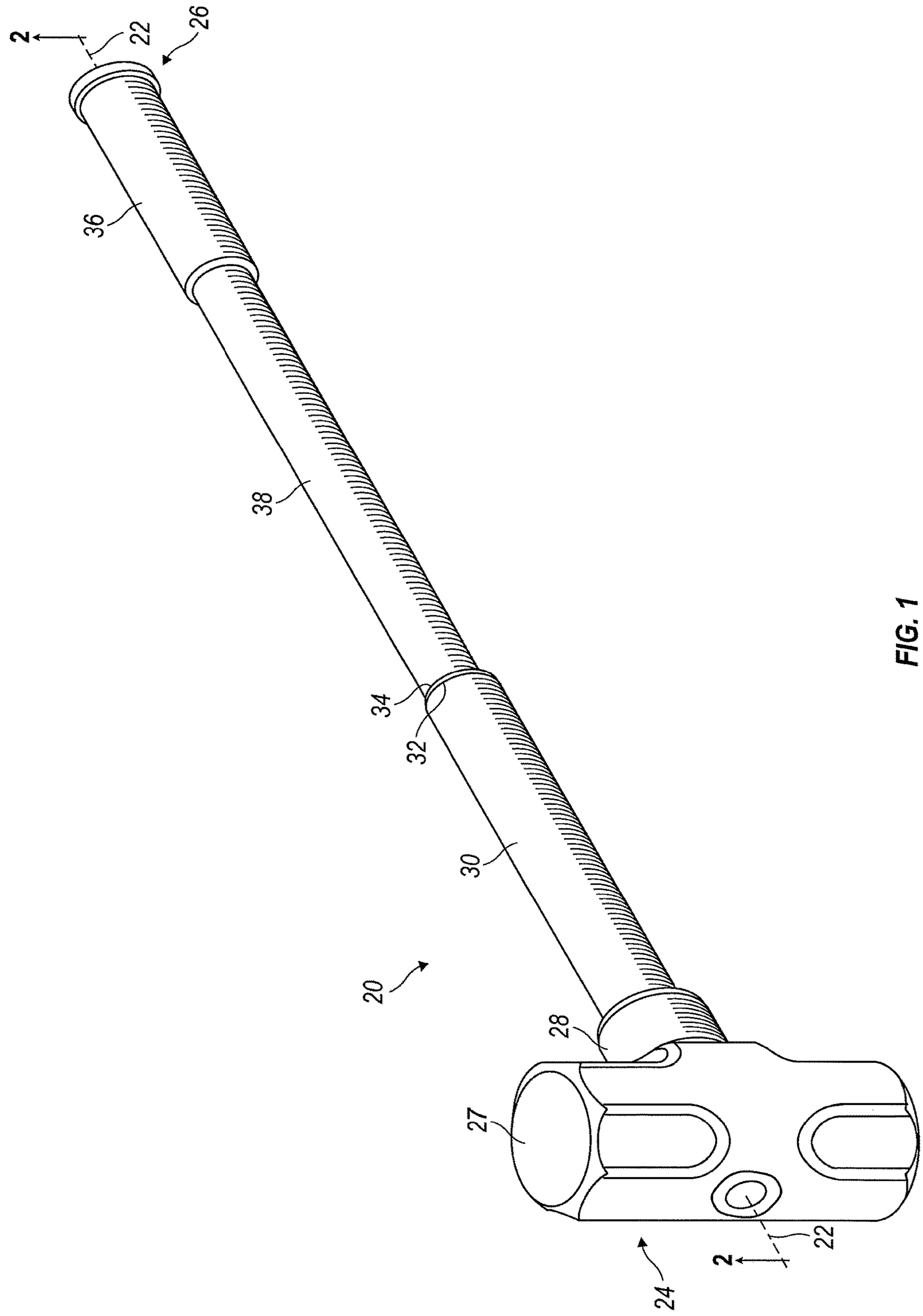



FIG. 1

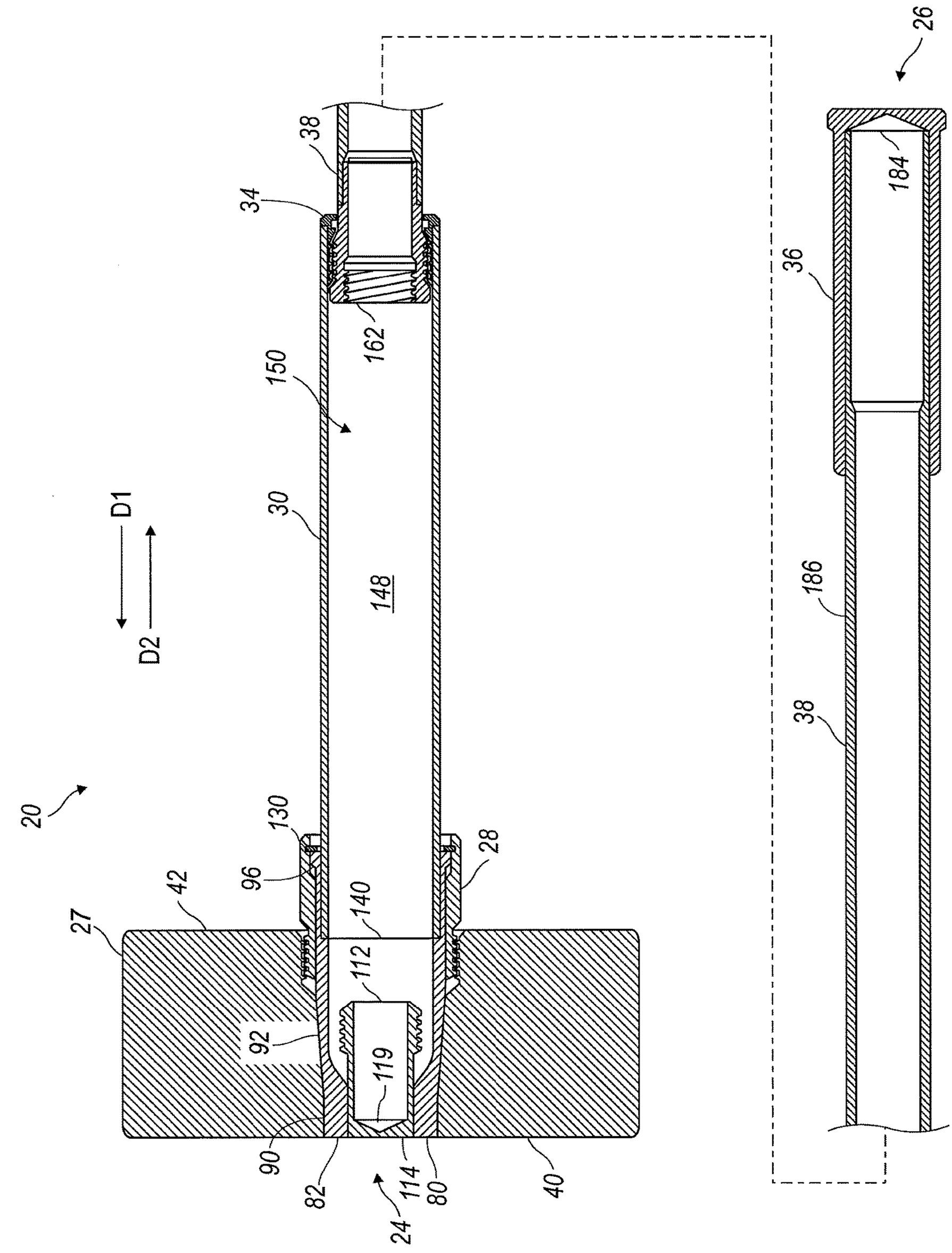

20
D1
D2
38
34
162
150
30
148
130
96
42
27
140
28
112
92
119
90
82
114
80
40
24
26
184
36
186
38

FIG. 2

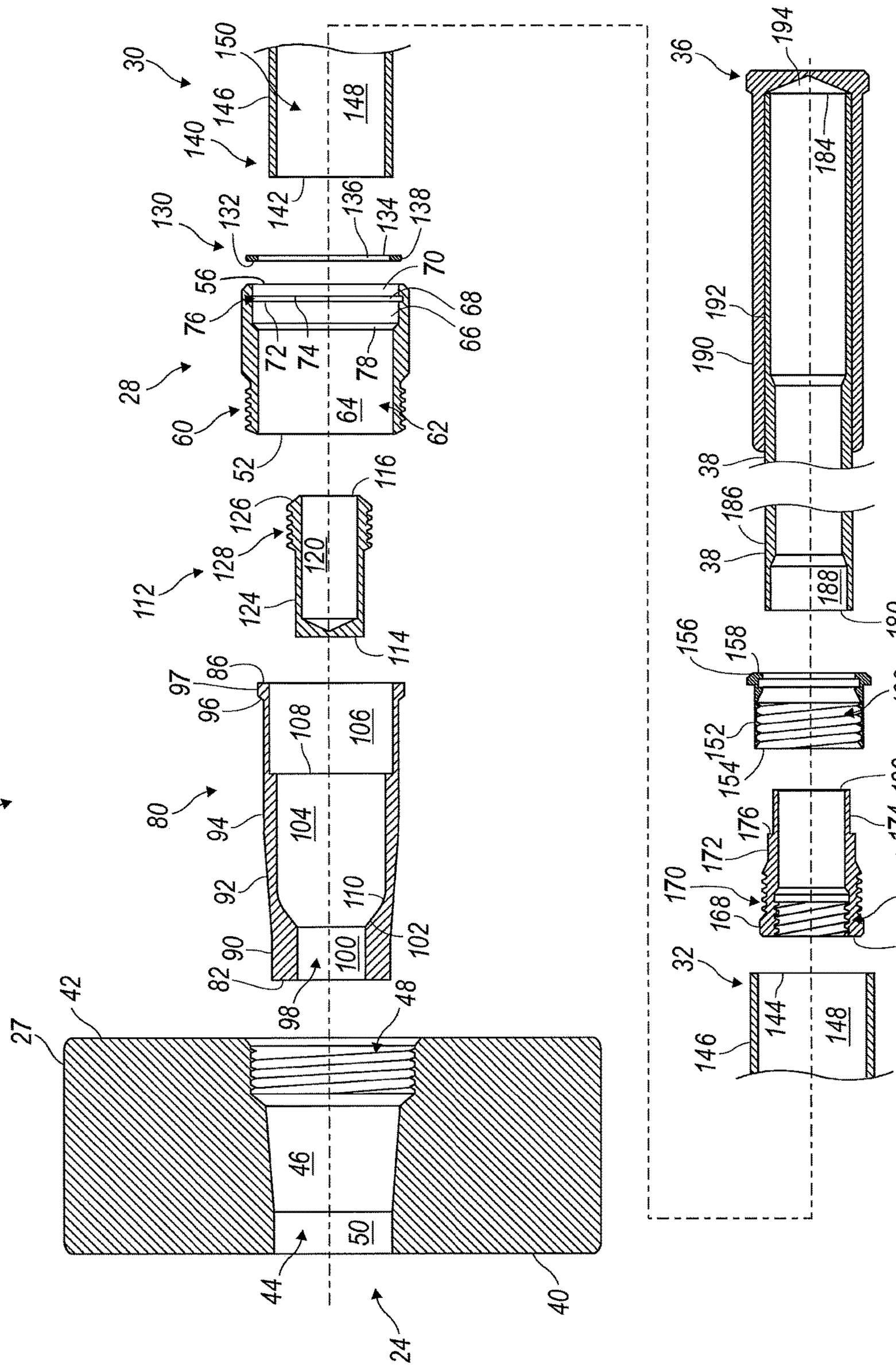

20
27
42
48
46
50
44
40
24
30
150
146
140
148
142
130
132
136
134
138
56
70
76
66
68
72
74
78
28
60
64
62
52
112
116
126
128
120
124
114
97
86
96
108
106
80
94
104
92
110
102
82
90
100
98
36
194
184
192
190
38
186
188
180
156
158
160
152
154
34
166
174
176
172
170
168
178
164
162
32
144
146
148

FIG. 3

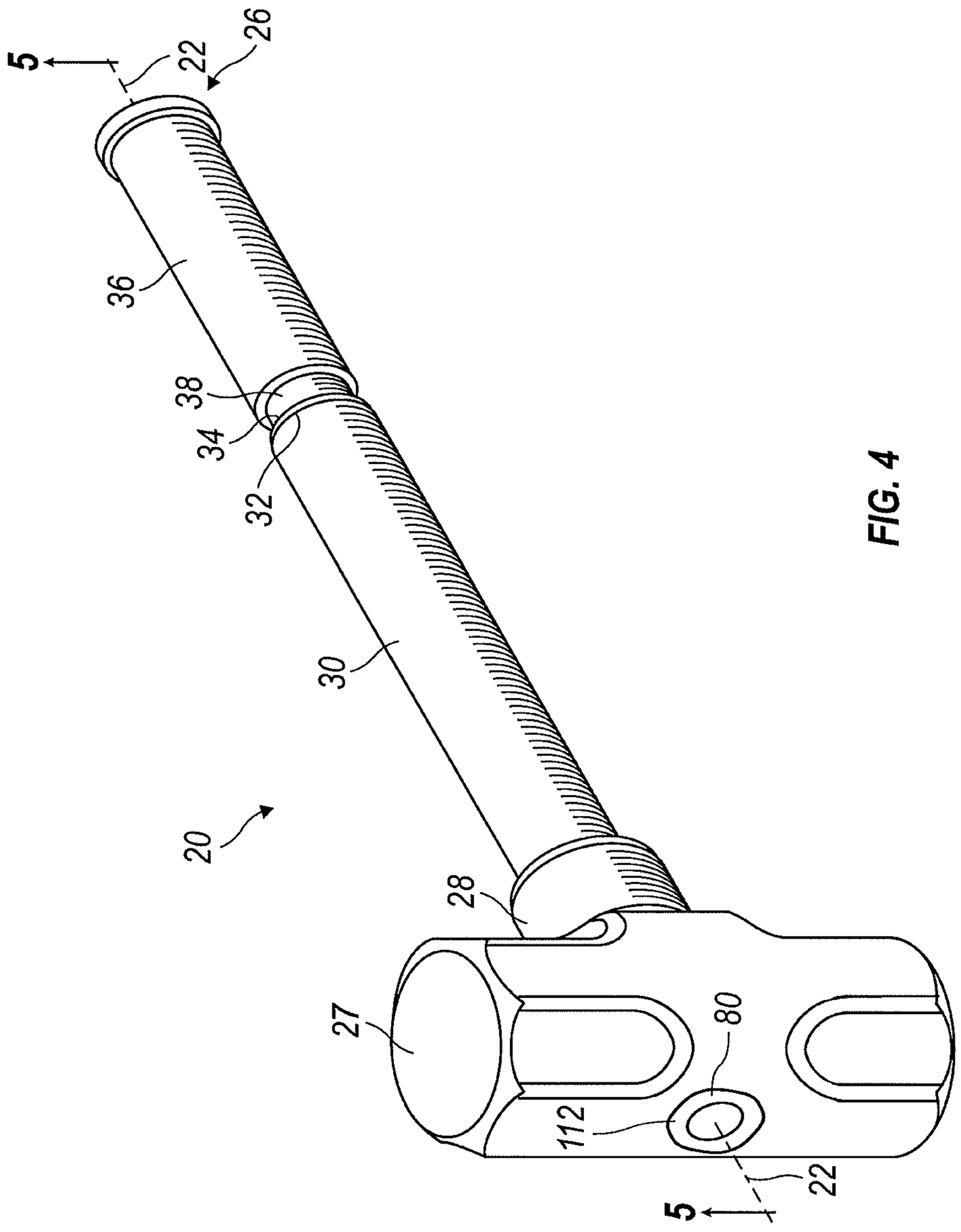



FIG. 4

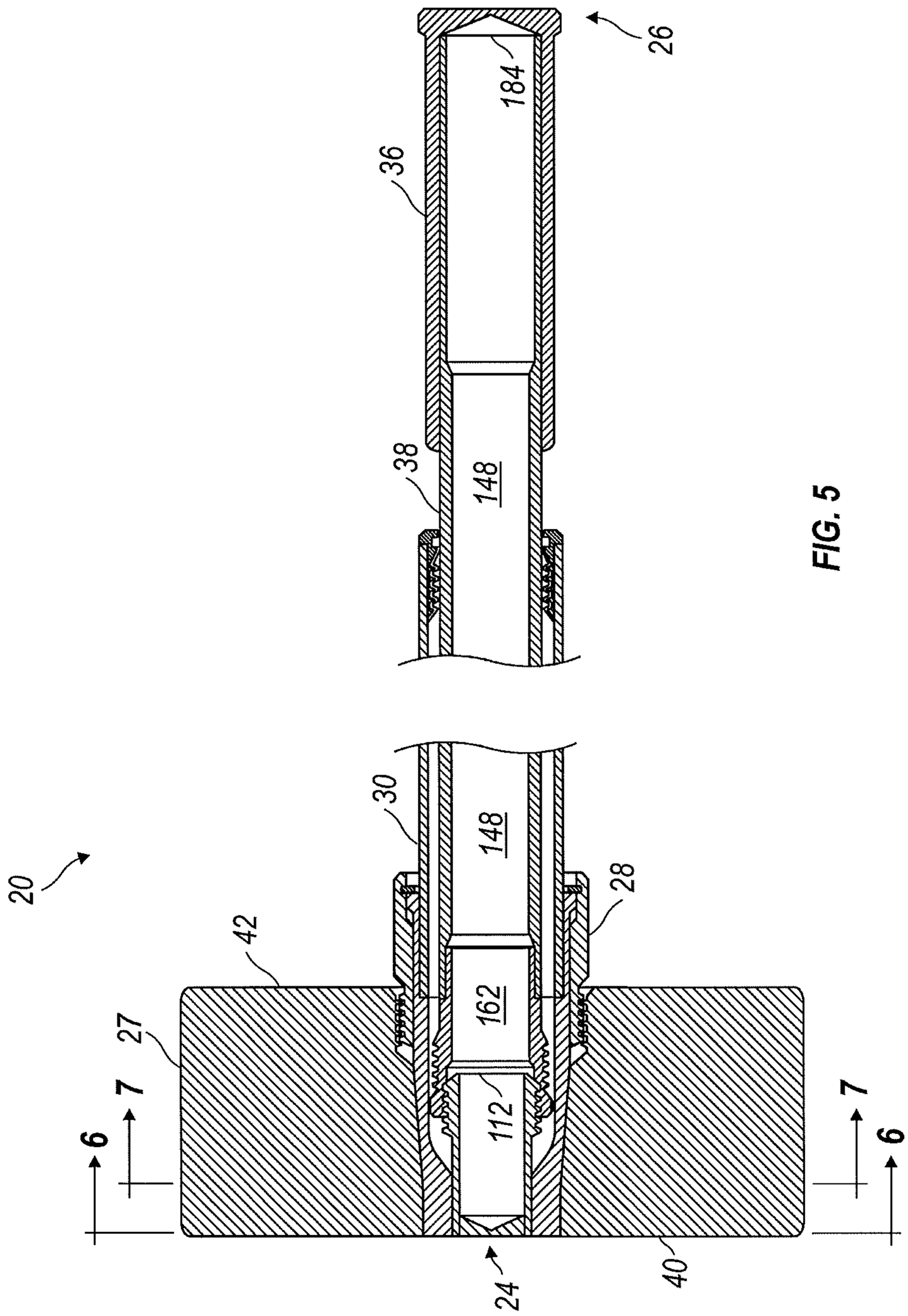



FIG. 5

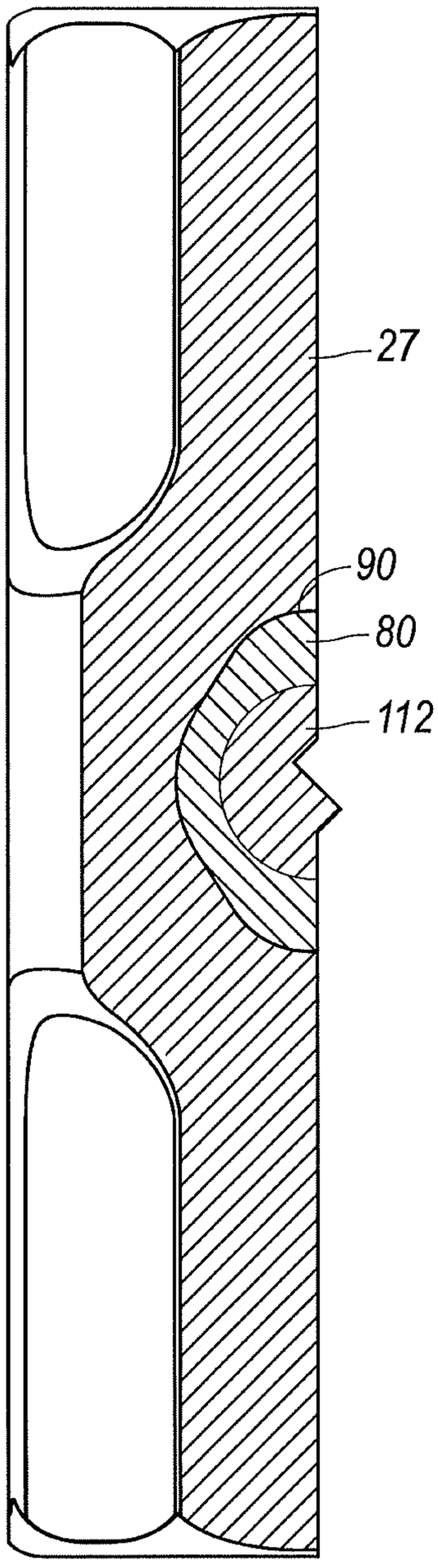



FIG. 6

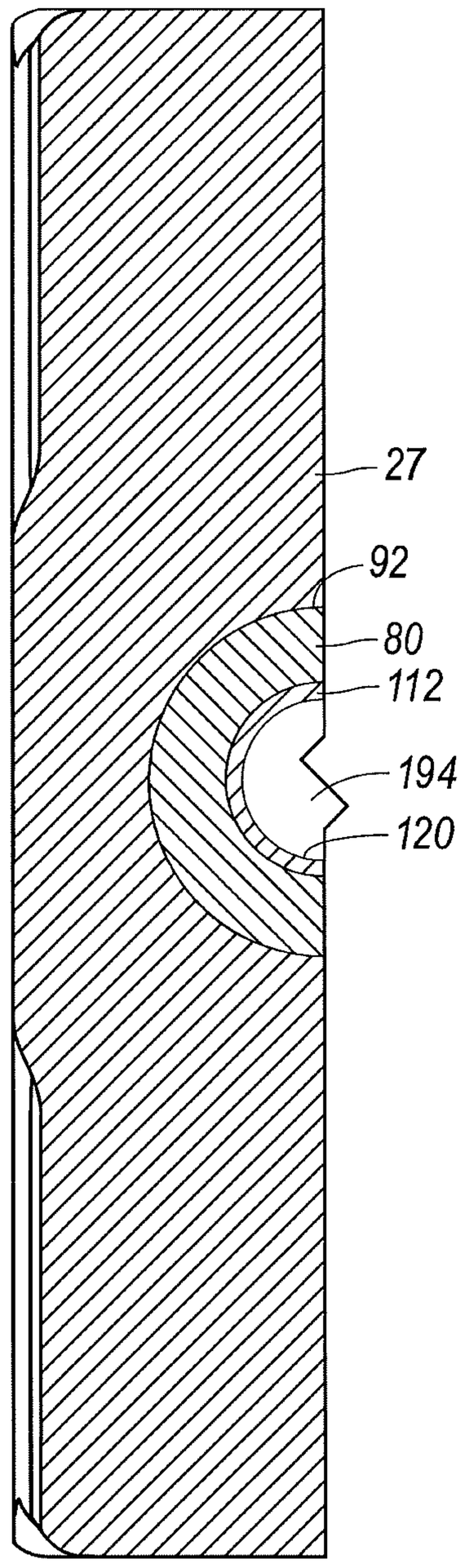



FIG. 7

# COLLAPSIBLE BREACHING TOOL

## CROSS REFERENCE TO RELATED APPLICATIONS

This continuation application claims priority to and the benefit of U.S. patent application Ser. No. 15/016,597, filed on Feb. 5, 2016, which claims priority to and the benefit of U.S. provisional application Ser. No. 62/140,421, filed Mar. 30, 2015, both of which are incorporated herein by reference.

## STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to tool for effecting forced entry of a building. More specifically, the invention relates to a breaching tool that is collapsible and expandable between an easily-transportable compressed state and an extended state for breaching a door, respectively.

### 2. Description of the Related Art

Both public-safety and military personnel are often faced with the need to perform a forced entry into structures. A forced entry can be, and often is, a life-threatening scenario during which every second counts. Shaving seconds from the operation can mean the difference between life-saving tactical surprise and life-ending ambush. Knowledge of and training with the variations in door-breaching techniques, however slight, as well as practice and conditioning for the door breaching operation, are vital to a tactical situation.

Breaching tools have been used throughout the ages for penetrating fortified positions. Breaching tools are commonly used today by the military, law enforcement, firefighters, emergency response workers, and other public safety personnel to effect forced entry into a building or structure. Typical breaching tools, however, are unwieldy and cumbersome. U.S. Pat. No. 4,681,171 (the '171 patent), for example, discloses a typical battering ram that includes a bulky, concrete-filled cylinder with an epoxy resin head. The battering ram disclosed in the '171 patent, however, is physically difficult to pack due to both its bulky design and its weight.

The inability of traditional, cumbersome breaching tools to be comfortably carried or packed has often lead soldiers, law enforcement officers, and other such public safety personnel to jettison the devices if the likelihood of use is low. Should such a device later be needed, the soldier must instead implement improvised methods of entry, such as shooting through the door or using explosives. Such improvised methods are dangerous for the user, and also increase the possibility of collateral damage to whomever or whatever is on the other side of the door.

## BRIEF SUMMARY OF THE INVENTION

The present invention is a collapsible breaching tool that can be expanded to a first configuration for breaching and compressed to a second configuration for transport or storage. The tool comprises a tool head; a handle hold connected to the tool head, the handle hold having an outer thread; a first handle tube having a first end, a second end, and defining a first handle tube volume; a second handle tube having a length, the second handle tube moveable between a first position in which most of the length is outside the first handle tube volume and a second position in which most of the length is within the first handle tube volume; an insert connected to the second handle tube, the insert having an inner thread engageable with the outer thread of the handle hold.



## BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. **1** is an isometric view of an embodiment of the present invention in an expanded, or breaching, state.

FIG. **2** is side sectional view of the embodiment through plane **2-2** of FIG. **1**.

FIG. **3** is a side sectional assembly view of the embodiment shown in FIG. **2**.

FIG. **4** is an isometric view of the embodiment in a retracted state.

FIG. **5** is a side sectional view of the embodiment through plane **5-5** of FIG. **4**.

FIG. **6** is a sectional view through plane **6-6** of FIG. **5**.

FIG. **7** is a section view through plane **7-7** of FIG. **5**.

## DETAILED DESCRIPTION OF THE VARIOUS EMBODIMENTS

Referring to FIG. **1**, an embodiment **20** of the invention is oriented along a longitudinal axis **22** and has a first end **24** and a second end **26**. The embodiment **20** includes a sledge hammer head **27** connected to a taper lock nut **28**. The taper lock nut **28** partially surrounds a first handle tube **30** with an end **32**. The end **32** partially surrounds a female insert **34**. A knurled handle **36** partially surrounds a second handle tube **38**.

Referring jointly to FIGS. **2-3**, the hammer head **27** has a first side **40** coterminal with the first end **24** and an opposing second side **42**. A passage **44** extends between the first side **40** and the second side **42**. The passage **44** is defined by a partially-conical surface **46**, a threaded section **48**, and a non-cylindrical surface **50**. The threaded section **48** has an inner diameter greater than the maximum diameter of the partially-conical section **46**.

The taper lock nut **28** is a solid metallic tubular body threaded to the threaded section **48** of the hammer head **27**. The nut **28** has a first annular surface **52** that defines a first opening having a first diameter and a second annular surface **56** that defines a second opening having a second diameter. An outwardly-threaded section **60** is engageable with the threaded section **48** of the head **27**. A second passage **62** is defined by a first inner cylindrical surface **64**, a second inner cylindrical surface **66**, a third inner cylindrical surface **68**, and a fourth inner cylindrical surface **70**. First and second inner annular surfaces **72**, **74** are adjacent to the third cylindrical surface **68** and define a toroidal groove **76**. A partially conical surface **78** is adjacent to, and longitudinally between, the first and second inner cylindrical surfaces **64**, **66**.

A taper lock adaptor **80** occupies the passage **44**. The adaptor **80** is a solid tubular body that includes a first non-cylindrical annular surface **82** defining a first opening and an opposing annular surface **86** defining a second opening. A first outer non-cylindrical surface **90** is adjacent to the first annular surface **82**. A first partially-conical outer

surface **92** is adjacent the first outer non-cylindrical surface **90**. The first partially-conical surface **92** has a maximum and minimum diameter slightly less than maximum and minimum diameters, respectively, of the partially conical inner surface **46**. A second outer cylindrical surface **94** is adjacent to the partially-conical surface **92**. A second partially-conical surface **96** is adjacent to the second cylindrical surface **94**. A third cylindrical surface **97** is adjacent to the second partially-conical surface **96** and has an outer diameter slightly less than the inner diameter of the third inner cylindrical surface **68**.

A third passage **98** is defined by a first inner cylindrical surface **100**, a first partially-conical inner surface **102** adjacent to the first inner cylindrical surface **100**, a second partially-conical surface **104**, and a second inner cylindrical surface **106**. An inner annular surface **108** is adjacent to the second partially-conical surface **104** and the second inner cylindrical surface **106**. A curved surface **110** is adjacent to, and longitudinally between, the first and second partially conical surfaces **102**, **104**.

A handle hold **112** is connected to the taper lock adaptor **80**. The hold **112** is a single metallic body that has a circular end surface **114** and an opposing annular end surface **116** defining an opening. A cylindrical inner surface **120** is adjacent to the annular surface **116**. A conical surface **119** is adjacent to the cylindrical inner surface **120**. A cylindrical outer surface **124** is adjacent to the end surface **114** and has a diameter slightly less than the first inner cylindrical surface **100** of the taper lock adaptor **80**. A partially conical outer surface **126** is adjacent to the annular end surface **116**. An outer thread **128** is longitudinally positioned between the cylindrical surface **124** and the partially conical surface **126**.

A retaining ring **130** occupies the groove **76**. The ring **130** has first and second annular surfaces **132**, **134**, an inner cylindrical surface **136**, and an outer cylindrical surface **138**.

The first handle tube **30** has a first end **140** radially within the taper lock adaptor **80** and the opposing second end **32**. The first end **140** includes a first annular surface **142** in contact with the annular surface **108** of the taper lock adaptor **80**. The second end **32** includes a second annular surface **144**. An outer cylindrical surface **146** extends between, and is adjacent to, the first and second annular surfaces **142**, **144**. The outer cylindrical surface **146** has a diameter less than the inner cylindrical surface **136** of the retaining ring **130** and the second inner cylindrical surface **106** of the taper lock adaptor **80**. An inner cylindrical surface **148** extends between, and is adjacent to, the first and second annular surfaces **142**, **144** and defines a cylindrical handle interior **150**.

The female insert **34** is a metallic tubular body that partially occupies the handle interior **150**. The insert **34** has a first outer cylindrical surface **152** with a diameter slightly less than the diameter of the inner cylindrical surface **148** of the first handle tube **30**. The insert **34** has a first annular end surface **154** within the interior **150**, a partially-conical surface **156**, and a second annular end surface **158**. The insert **34** has an internally-threaded passage **160**.

The embodiment **20** further includes a male insert **162** that is a metallic tubular body partially occupying part of the handle interior **150** and the internally-threaded passage **160**. The male insert **162** has a first annular surface **164**, an opposing second annular surface **166**, and a first outer cylindrical surface **168** having an outer diameter greater than the inner diameter of the first annular surface **154** of the of the female insert **34**. The male insert **162** has an outer thread **170** engageable with the inner thread **160** of the female insert **34**, and a second outer cylindrical surface **172** longitudinally between the outer thread **170** and the second annular surface **166**. The male insert **162** includes a third outer cylindrical surface **174** adjacent to the second annular surface **166** and an intermediate annular surface **176** adjacent to the second and third outer cylindrical surfaces **172**, **174**. The male insert **162** includes an inner thread **178** engageable with the outer thread **128** of the handle hold **112**.

The second handle tube **38** is connected to the male insert **162**. The second handle tube **38** is a generally tubular body having a first annular end surface **180** defining a first opening and an opposing second annular end surface **184**. The first annular end surface **180** abuts the intermediate annular surface **176** of the male insert **162**. A cylindrical outer surface **186** extends between, and is adjacent to, the first and second annular surfaces **180**, **184**. A first inner cylindrical surface **188** is adjacent to the first annular surface **180** and has a diameter slightly larger than the diameter of the third outer cylindrical surface **174** of the male insert **162**.

The handle **36** is connected to the second handle tube **38**. The handle **36** has a knurled outer surface **190** and a cylindrical inner surface **192**. A conical inner surface **194** is adjacent to the cylindrical inner surface **192**.

FIG. **2** shows the embodiment **20** in the expanded state. Longitudinal movement of the lock adaptor **80** in a first direction D**1** is inhibited by contact of the partially-conical outer surface **92** of the lock adaptor **80** with the partially-conical inner surface **46** of the head **27**. Longitudinal movement of the lock adaptor **80** in an opposite second direction D**2** is inhibited by contact of the annular end surface **86** with the retaining ring **130**.

Referring to FIGS. **4-5**, which show the embodiment **20** in a compressed state, the male insert **162** is threadedly engaged with the handle hold **112**. To move the embodiment **20** from the expanded state shown in FIG. **2** to the compressed state, the first handle tube **30** is rotated relative to the second handle tube **38**. This causes rotation of the attached male insert **162** relative to the female insert **34** to disengage the inserts' respective threads **160**, **170**. After disengagement, the second handle tube **38** may be moved longitudinally into the first handle tube **30** until the inner thread **178** of the male insert **162** engage with the outer thread **128** of the handle hold **112**. The slight taper of the partially-conical surface **104** of the lock adaptor **80** facilitates proper alignment of the male insert **162** with the handle hold **112**.

Referring to FIGS. **6-7**, rotational movement of the head **27** relative to the lock adaptor **80** is inhibited by the non-circular outer surface **90** of the taper lock adaptor **80**. The male insert **162** is inhibited from longitudinal movement relative to the female insert **34** due to threaded engagement therewith.

While the embodiment comprises a hammer head **27**, alternative embodiments may include interchangeable heads, such as a fork head, a horn head, or a halligan head.

The present invention is described in terms of a preferred illustrative embodiment of a specifically-described apparatus. Those skilled in the art will recognize that alternative constructions of such a device can be used in carrying out the present invention. Other aspects, features, and advantages of the present invention may be obtained from a study of this disclosure and the drawings, along with the appended claims.

I claim:

**1**. A collapsible breaching tool comprising:

a tool head having a first side, a second side, and a passage extending within the tool head between the first side and the second side;

a handle hold at least partially within the passage, the handle hold having an outer thread;

a first handle tube having a first end, a second end, and defining a first handle tube volume, the first end within the passage;

a second handle tube having a first end, a second end, and a length;

a female insert at least partially within the first handle tube volume and connected to the second end of the first handle tube, the female insert having an inner thread; and

a male insert connected to the first end of the second handle tube, the male insert having an inner thread engageable with the outer thread of the handle hold and having an outer thread engageable with the inner thread of the female insert.

**2**. The collapsible breaching tool of claim **1** wherein the second handle tube is moveable between a first position in which most of the length is outside the first handle tube volume and a second position in which most of the length is within the first handle tube volume.

**3**. The collapsible breaching tool of claim **1** further comprising a lock adaptor connected to the handle hold and the first end of the first handle tube.

**4**. The collapsible breaching tool of claim **3** further comprising a threaded section within the passage and a lock nut positioned around at least a portion of the lock adaptor, said lock nut having an outwardly threaded section enagageable with the threaded section of the passage.

**5**. The collapsible breaching tool of claim **4** wherein the lock nut is positioned around the first end of the first handle tube.

**6**. The collapsible breaching tool of claim **1** further comprising a threaded section within the passage and a lock nut positioned around at least a portion of the first handle tube, said lock nut having an outwardly threaded section enagageable with the threaded section of the passage.

**7**. The collapsible breaching tool of claim **1** wherein the handle hold is wholly within the passage.

**8**. The collapsible breaching tool of claim **1** wherein the inner thread of the male insert is engaged with the outer thread of the handle hold.

**9**. The collapsible breaching tool of claim **1** wherein the outer thread of the male insert is engaged with the inner thread of the female insert.

**10**. The collapsible breaching tool of claim **1** wherein the passage extends from the first side of the tool head to the second side of the tool head.

**11**. A collapsible breaching tool comprising:

a tool head having an opening into an interior space;

a handle hold at least partially within the interior space, the handle hold having an outer thread;

a first handle tube having a first end, a second end, and defining a first handle tube volume, the first end within the interior space;

a second handle tube having a first end, a second end, and a length;

a female insert at least partially within the first handle tube volume and connected to the second end of the first handle tube, the female insert having an inner thread; and

a male insert connected to the first end of the second handle tube, the male insert having an inner thread engageable with the outer thread of the handle hold and having an outer thread engageable with the inner thread of the female insert.

**12**. The collapsible breaching tool of claim **11** further comprising a lock adaptor connected to the handle hold and the first end of the first handle tube.

**13**. The collapsible breaching tool of claim **12** further comprising a threaded section within the interior space and a lock nut positioned around at least a portion of the lock adaptor, said lock nut having an outwardly threaded section enagageable with the threaded section of the interior space.

**14**. The collapsible breaching tool of claim **13** wherein the lock nut is positioned around the first end of the first handle tube.

**15**. The collapsible breaching tool of claim **11** further comprising a threaded section within the interior space and a lock nut positioned around at least a portion of the first handle tube, said lock nut having an outwardly threaded section enagageable with the threaded section of the interior space.

**16**. The collapsible breaching tool of claim **11** wherein the handle hold is wholly within the interior space.

**17**. A collapsible breaching tool comprising:

a tool head;

a handle hold connected to the tool head, the handle hold having an outer thread;

a first handle tube having a first end, a second end, and defining a first handle tube volume;

a second handle tube having a first end, a second end, and a length;

a female insert at least partially within the first handle tube volume and connected to the second end of the first handle tube, the female insert having an inner thread; and

a male insert connected to the first end of the second handle tube, the male insert having an inner thread engageable with the outer thread of the handle hold and having an outer thread engageable with the inner thread of the female insert.

**18**. The collapsible breaching tool of claim **17** wherein the handle hold is at least partially within the tool head.

**19**. The collapsible breaching tool of claim **18** wherein the handle hold is connected to the tool head through a lock adaptor within the tool head.

**20**. The collapsible breaching tool of claim **17** wherein the first end of the first handle tube is at least partially within the tool head.

* * * * *